Asthma Project
Interdisciplinary Analysis of Childhood Asthma in Baltimore, Maryland

Principal Investigators:
Dr. Elissa Levine, Dr. Dan Kimes,
NASA/Goddard Space Flight Center

Dr. Carol Blaisdell
University of MD Medical Center

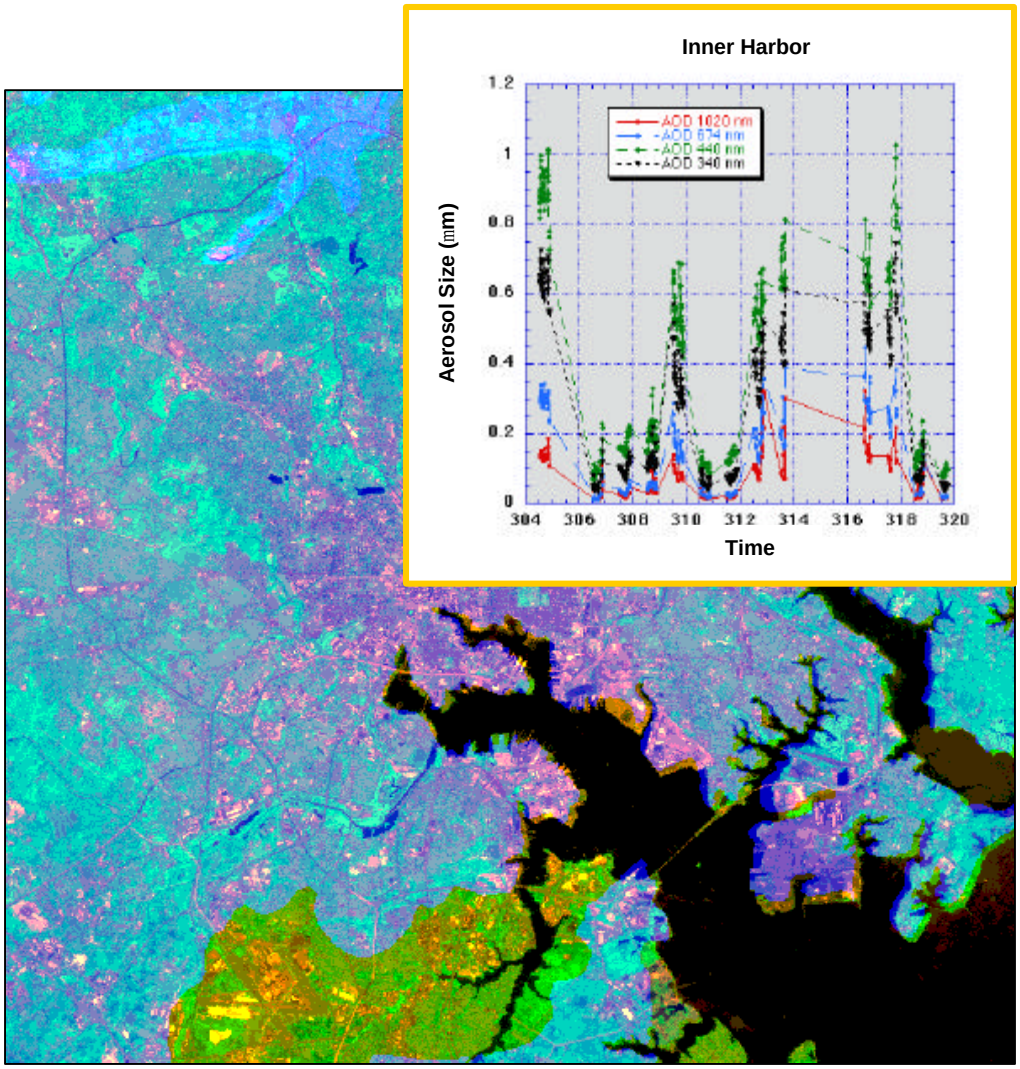
Co-Investigators:
Dr. Mary Beth Bollinger, Dr. Sheila Weiss,
Dr. Sania Amr, Dr. Judith Lovchik
University of MD Medical Center

Dr. Ross Nelson, Brent Holben
NASA/Goddard Space Flight Center

Others:
Sidey Tmmins (Decisions Systems Technology)
Asad Ullah (Science Systems Applications, Inc.)
Teresa Aquino (Science Systems Applications, Inc.)
Kendra Drob (Science Systems Applications, Inc.)

Description:

- The incidence of asthma is escalating within the U.S. and children are particularly impacted with hospitalizations increasing 74% since 1979.
- This study will investigate possible environmental triggers of asthma in Baltimore, MD, a city in the top quintile for children's asthma in the U.S.



- This is a GIS overlay of soil types over a recent Landsat image of the Baltimore, MD region. It features an aerosol optical depth plot measured at the Maryland Science Center in Baltimore during the month of November 1999.
- Large variations in aerosols can be observed between days caused by local and regional emissions under alternately stagnant and well-ventilated meteorological conditions.
- These and other remotely sensed and in situ data will be used to assess their impact on asthma through GIS and modeling techniques.

Objectives:

- To collect and integrate, using GIS, a comprehensive suite of climate, environmental, and remotely sensed measurements and clinical records that have possible relationships to the occurrence of asthma in the Baltimore, Maryland region.
- To use a combination of linear and non-linear statistical and neural network modeling techniques to identify key trigger variables, derive difficult to obtain variables, and predict asthma occurrence from these key variables on a spatial and temporal basis.
- To define and utilize the combined expertise of a multidisciplinary team of Earth and atmospheric scientists, mathematical modelers, pediatric allergists, pulmunologists, epidemiologists, and viralogists, and representatives of the Baltimore Health Department and school system to assist in model design, analysis and interpretation of model results, publications and presentations.
- To provide a prototype research model for other regions and similar studies.
- To provide important information to both the scientific community and the general public about the relationships between environmental conditions and asthma incidence as well as the preliminary structure of an early warning system for asthma occurrence.

Recent Findings:

- A strong seasonal pattern, with peaks in spring and fall and lows in summer and winter, has been observed for pediatric asthma admissions and emergency room visits in Baltimore, with a similar trend in timing of epidemics throughout Maryland.
- This temporal trend supports the relationship between asthma and some environmental triggers, but contradicts others, which have previously been linked with asthma (e.g. atmospheric ozone, which peaks in the summer and declines in spring and fall).
- Using the information embedded in these historical data, predictions can be made of asthma admissions with relatively high accuracy using neural network models